

land cover and soil parameterization parameters

Posted by adehocos - 2007/11/22 12:27

hello!

I am trying to apply kineros (1.5 beta version) to my own data, and I'm using fao tables in step 2. I understand the procedence of the data calculated for each plane except 'cohesion', 'splash' and 'ks' (the programm modifies input ks) Can anybody help me??

thanks a lot in advance!

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Re:land cover and soil parameterization parameters

Posted by isburns - 2007/11/26 19:06

The "Cohesion" parameter in AGWA can be semantically confusing. Common sense dictates that cohesion is the measure of the soil's ability to stick to itself, however in AGWA the cohesion column represents the "coh" parameter in KINEROS2, which is actually a measure of erosion due to cohesion (or lack of). Increasing the cohesion parameter in AGWA will increase the cohesion related erosion. The reason we labeled the column "cohesion" in AGWA is because that is the name of the parameter in the KINEROS parameter file, so we were just following the KINEROS convention.

The "Splash" parameter in AGWA represents erosion due to raindrop splash. It is calculated using the texture of the soil and the KFF field in the kin_lut.dbf.

KS is saturated hydraulic conductivity. It is calculated using the texture of the soil and the KS field in the kin_lut.dbf.

Shea

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Re:land cover and soil parameterization parameters

Posted by adehocos - 2007/11/27 09:12

Thank you very much for your help, but what I really needed to know is the specific calculations the program follows in Step 2 in order to obtain 'Cohesion', 'Splash' and 'Ks' for each plane.

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KS calculation

Posted by isburns - 2007/11/27 20:51

KS is calculated using the following equation where bulk density (bd) and rockByVolume are both extracted from the soil look-up tables:

'Calculate porosity from bulk density

$\text{porosity} = (2.65 - \text{bd}) / 2.65$

'Convert rockByVolume to rockByWeight

$\text{rockByWeight} = ((1 - \text{porosity}) * (1 - \text{rockByVolume})) / (1 - (\text{porosity} * (1 - \text{rockByVolume})))$

'Adjust the estimate of Ks for rock fragments.

$\text{ks} = \text{ks} * \text{rockByWeight}$

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Splash calculation

Posted by isburns - 2007/11/27 20:54

Splash is calculated using the following equation where kff is extracted from the kin_lut.dbf using the texture of the soil:

$\text{splash} = 0.8 * 422 * \text{kff}$

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Cohesion calculation

Posted by isburns - 2007/11/27 20:59

Cohesion is calculated using the following equation where clay is extracted from the FAO_properties.dbf, or if that table doesn't have it from the FA0_summ.dbf, and kff is extracted from the kin_lut.dbf using the texture of the soil:

if clay

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Area weighting

Posted by isburns - 2007/11/27 21:02

Each of the above calculations is performed for every soil/plane intersection and then area weighted to arrive at the final value assigned to the plane.

Shea

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Re:Area weighting

Posted by adehocos - 2007/11/28 11:13

I understand everything you have explained to me, but when I work with my own data results for 'ks' don't agree at all! I assume that you refer to 'bd_top', or 'bd_sub', or average (fao_summ.dbf) when you mention 'bulk density', and that 'rockbyvolume' is the same as rock in the planes' shapefile('frag_top' in fao_summ.dbf). I have calculated 'rockbyweight' and multiplied it for 'ks' in kin_lut.dbf and don't have the same results as the model's.

Another question that worries me is that I have interpreted fao tables fields on my own, as I haven't found any fao document explaining legend and units.

Thanks a lot in advance!

Ana

KS modification

Posted by isburns - 2007/11/28 17:43

Actually, you are correct. I forgot to include the final modifications to KS to adjust it based on missing data and impervious area. The final adjustment to KS is made in the following two equations, the first of which is performed in a loop that iterates through all soil/plane intersections where ks is the value that will be written to the watershed attribute table, ksIntersection is the value for the current intersection in the loop, pct is percent of the plane the current intersection represents, and adjAmt is the percentage of the plane for which no data exists in the look-up tables added to the percentage of impervious soil types such as rock, salt, or glacier (SNUMS 3264, 6694, 6998, 193, or 251):

$$ks = ks + (ksIntersection * (pct / (1 - adjAmt)))$$

After the above value has been written to the watershed attribute table, the following calculation is performed where the variables in brackets represent the fields in the watershed attribute table. The unbracketed ks is the final value written to the watershed attribute table and it replaces the value in the above equation.

$$ks = *(2.71828^{*(0.0105)})*(1-)$$

Re:Area weighting

Posted by isburns - 2007/11/28 17:46

You are also correct in that we get bulk density from 'bd_top' and we get rockByVolume from 'frag_top'. I don't have the what we used for interpreting the fields and their units at hand, but if you like I can track it down and either post a URL to it or include it somewhere to be downloaded.

Shea

Re:Area weighting

Posted by adehoces - 2007/11/29 12:22

Thank you! Finally everything makes sense. I would love to have that fao document, so please let me know if you find it. Greetings,
ana

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Re:Area weighting

Posted by adehocos - 2009/08/21 12:57

Hello again! I need that fao document with legend and units we talked about, I understand that it was a long time ago but, did you find it? could you please post it somewhere?

Thanks a lot in advance,
Ana

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Re:Area weighting

Posted by adehocos - 2009/08/24 11:28

Well, what I particularly need to know is 'kff' units. I am a bit confused about that because the documentation I am using (AGWA manual, Kinneros Manual ARS-77, Erosion and Sediment transport pdf file and several publications) makes clear that kff refers to K usle factor, but I am not sure about the units that are used. The USLE states K units depend on R units so I have no idea about the kff units in which kinlut. dbf is expressed.

Can anybody help me? Thanks a lot in advance again,
Ana

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Re:Area weighting

Posted by lainie - 2009/08/24 18:32

Hi Ana,

You are correct that Kff is the same as the K factor in USLE, and is the soil erodibility factor. It is a dimensionless factor from 0-1. The actual units from the RUSLE handbook are:

$\text{Tons} * \text{acre} * \text{hour} / \text{hundreds of acre-foot} * \text{ton force} * \text{inch}$

(multiply by 0.1317 to get SI units)

$\text{Metric ton} * \text{hectare} * \text{hour} / \text{hectare} * \text{megajoule} * \text{millimeter}$

I hope that helps. I am also attaching the full documentation used to incorporate FAO soils into AGWA.

Lainie http://www.tucson.ars.ag.gov/agwa/images/fbfiles/files/FAOsoil_AGWALogic2009.zip

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Re:Area weighting

Posted by adehoccs - 2009/08/25 08:03

Ok, but then I don't understand how you can get a dimensionless factor from Kusle, is it referred to the maximum Kusle value or something like that?

Ana

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